SUPPLEMENT.

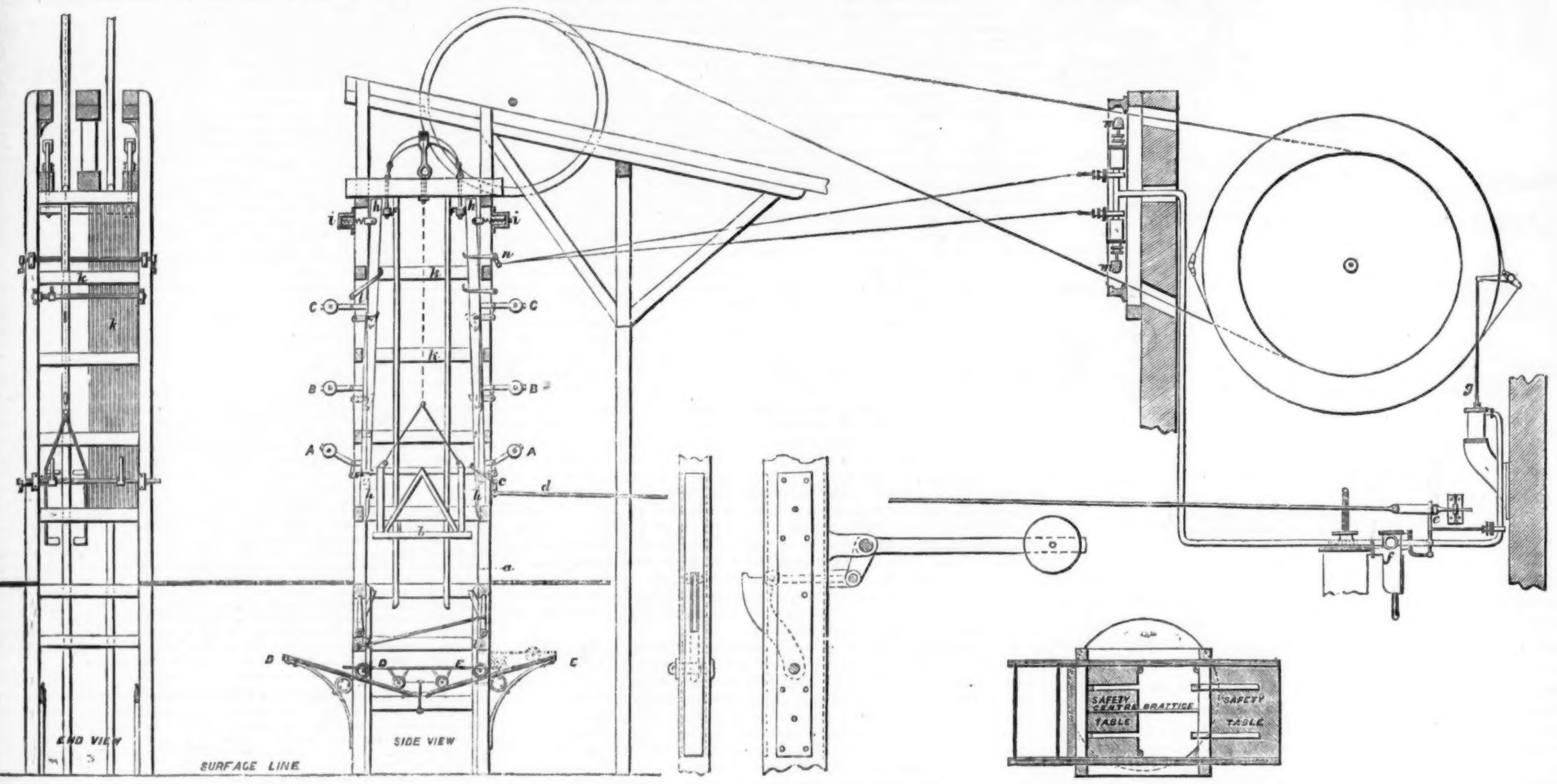
The Mining Journal,

[R]AILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[N]o. 1674.—VOL. XXXVII. LONDON, SATURDAY, SEPTEMBER 21, 1867. STAMPED .. SIXPENCE. UNSTAMPED. FIVEPENCE.

PREVENTING ACCIDENTS FROM OVERWINDING.



too frequently happens that the attempts to prevent accidents nly in connection with colliery operations but in every business ein danger is incurred emanates from those who, having had no ical experience in the particular direction necessary, are totally le to appreciate the difficulties or devise a remedy, the conse- ce being that the inventions, although theoretically perfect, are ically useless. The name of Mr. JOHN MARLEY, M.E., M. Inst. of Darlington, is so well known in connection with colliery ations that any suggestion made by him is sure to receive atten- ; it is, therefore, gratifying to be enabled to publish a complete iption of the invention which he has just patented for improve- s in the prevention of overwinding and falling of the cage in s, independently of the detaching hook and safety-cage, and pro- g safety-chamber, safety-table, rope clutches, and safety-buffers. the improvements in the prevention of over-winding of the cage, pendently of the detaching hook, when the cage bottom is drawn nd the safe point above the settle-board (marked on the diagram catch is actuated, which by suitable mechanism at the same shuts off the steam from the engine and applies it to a powerful n brake. In passing the said point, *a*, the cage enters conductors ually contracted towards the top, so as to have the effect of stop- the cage, which conductors rest at their upper part either against gs or weights, in such a way as to admit of their opening out to extent, and effect the purpose of not stopping the cage suddenly. e safety-chamber consists of boxes, either close or grated when ssary, corresponding with the size of the cage in such a way as event the men from either falling or leaping out of the same the cage is drawn into them, which boxes extend in height the bottom of the aforesaid conductors to their top at the safety- rs. In order to prevent the cage from falling out of this cham- through the breakage of the rope, even if a safety-cage be used, ies of catches or keps is placed within the same.

e safety-table is placed immediately under the ordinary keps, covers the whole of the working shaft, by the closing of two s or trucks. When the cage reaches a catch near the top of the y-chamber the mechanism is actuated by which the safety-tables cks are released, and run down an incline, so as to close over the . When no detaching hook is used the inventor applies rope hes, which he prefers to work by steam, and which he places on rope, at a convenient point between the pullies and the drum, which are actuated by separate catches, also near the top of the y-chamber. The safety-buffers are placed immediately under the es, and are held down by springs or weights, in such a way as nder less severe the collision should the cage ever reach that , and render the further progress of the cage impossible.

the above diagram A, B, C are the keps of the safety-chamber; are the safety-tables; and F F are the safety-buffers; *a* is the y point; *b*, the cage bottom; *c*, the catch for giving motion to nechanism *e* (beneath the drum) by means of the connecting , and thus shutting off the steam and applying the brake; *f* is hut-off from engine; *g* is the steam brake; *h*, *h*, *h*, *h* are con- rs; *i*, contraction springs, for which weights may be substituted; *k*, *k*, safety-chamber; *l l*, catch mechanism of safety table; rope clutches; *n*, catches for the same.

great advantage which the present arrangement possesses over those which have previously been proposed is obvious—the automatic contrivances do not in any way interfere with the duties of the engineman or banksman, inasmuch as the whole of the safety apparatus is situated above the line of safety. As long as the cage is properly stopped upon arriving at the bank, its entire management is left in the hands of the engine tenter, precisely as at present, and no part of the machinery with which he has to deal is acted upon by the mechanism connected with the safety-chamber; but whenever there is neglect on his part the automatic arrangement comes into play, and, turning off the steam, applying the brake, and clutching the winding-rope prevents the accident which would otherwise be inevitable. To prevent the engine tenter placing any reliance upon the safety apparatus, it would be very easy to provide that he should be subjected to a fine whenever the apparatus is acted upon; and the fact of its being so acted upon could easily be announced by attaching to it a suitable and audible alarum, so that the complaints sometimes heard that the provision of safety apparatus leads to neglect on the part of those in conjunction with them would not be tenable. The position of the safety apparatus, however, will be objected to by many, on the ground that, as it is only acted upon in case of accident, it is liable to cease to be in working order without anyone being the wiser, and that it may, therefore, be found useless at the very moment it is required. But the number who urge that an apparatus should be constantly acted upon, and thus continually tested, is not larger than that of those who maintain the opinion that much unnecessary wear and tear is thus caused; and it seems to be quite an open question whether more danger is not to be apprehended from the wear and tear than from neglect of examination. No doubt Mr. Marley has carefully studied all these points, and would be prepared to meet any objection which might be raised. All the arrangements appear to be simple, not liable to derangement, and not likely to require any large amount of attention to keep them at all times in reliable working order.

MANUFACTURE OF COKE AND CHARCOAL.

The essential feature of the invention of Mr. H. CHAMBERLAIN, of Wakefield, consists in gradually heating up the anthracite or other substance under treatment, and gradually cooling down the same after it has attained the proper temperature, such process being carried on in a continuous manner. The ovens which it is proposed to employ in this system of coking are made of any continuous form, such, for example, as an annular or oval form, the annular or oval chamber or space being subdivided by moveable doors or diaphragms into compartments, each of which communicates by a radial flue of its own with a central chimney, to which all the flues converge. These flues are each provided with dampers, whereby any one of them may be opened to the chimney whilst the others remain closed. The anthracite or other substance to be treated may be introduced into retorts or close chambers, constructed within the annular or continuous chamber through holes in the top or sides thereof, and such chamber may be provided with vertical retorts discharging through the floor into a chamber beneath for removal.

The process of working is very simple. Supposing the entire space to be filled with anthracite, for example, in retorts or closed fire-clay constructions, round which the flames of the furnace can have free play in their onward passage, one of the compartments is fired, the diaphragm in the rear of such compartment being closed and all the rest opened; the products of combustion, or otherwise waste heat, will then circulate entirely round the annular oven and gradually heat up the retorts filled with anthracite contained therein, and finally escape into the chimney through the flue immediately in the rear of the closed diaphragm, that flue being the only one left open for the time being. When the charge in the first compartment is sufficiently burnt that in the second compartment is fired whilst the first charge is gradually cooling; the third compartment is then fired whilst the second is gradually cooling, and so on throughout the entire series. So soon as the charges which have been burnt have become sufficiently cool they are withdrawn, and a fresh charge of anthracite introduced, after which the diaphragm in the rear is opened, and that in advance of the new charge is shut, thus bringing the new charge within the range of the series of compartments being heated up preparatory to burning; the damper in the flue last in operation must, of course, be shut, and that in the flue in connection with the newly-charged compartment opened. It will thus be seen that the operations of gradually heating up, firing, and gradually cooling the contents of the retorts in the oven, and the withdrawal and replacing of the charges, are all carried on in a continuous manner.

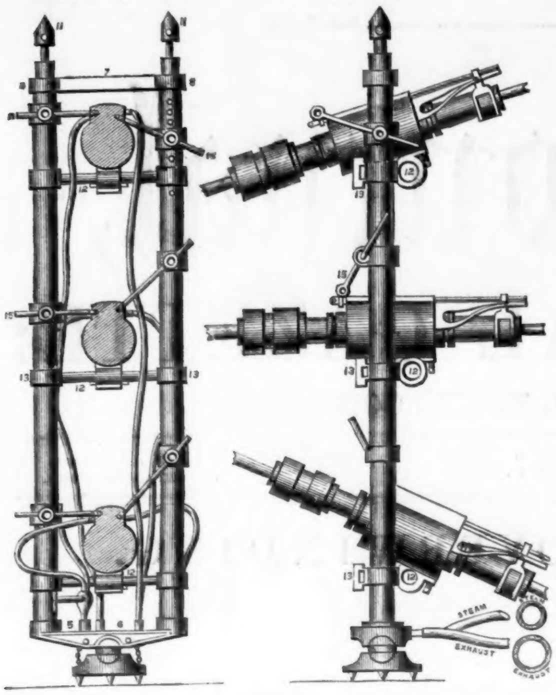
AUTOMATIC BOILER FEEDER.—The chief feature of the invention of Mr. A. F. NEYNABER, of Philadelphia, U.S., consists in the construction and application of valves, by means of which the steam of a boiler is brought to act on a piston or alarm whistle when the water falls to a given point, said action of steam being maintained until the water in the boiler rises to a certain point, and is then cut off, and thus a motive-power is gained from the moment when the boiler wants feeding until it is sufficiently fed, and no longer, which so gained motive-power can be used to perform the work of feeding the boiler automatically. This is a valve consisting of a float to which, at the upper part, the valve stem is pivoted. This valve stem is of peculiar construction, and one of the most important parts of the apparatus. It terminates in a parallel plug of one-eighth of an inch diameter and one-half an inch long. This plug slides into a hole, and thereby closes or opens it, and is so constructed that the pressure of the steam on the plug is reduced, and friction avoided, so that by means of the weight of the float the valve will always open when the water descends through the pipe, which connects the valve-chest with the interior of the boiler below the surface of the water, and at the lowest line of safety. There is a second valve of the same construction, with the exception of having a larger valve-stem and seat, and of the lower pipe dipping only just to the water line. Above the first-mentioned valve is a pipe whereon to attach a steam-whistle, or also a steam-trap, for the separation of the steam from any water. At the top end of this pipe is a piston, which is moved by the steam escaping through the valves already referred to; this piston is weighted by a lever supported in the usual manner. When the level of the water falls below the line of safety the piston is raised, and a communication is by this means made between the steam space and the feed-pump. The movement of the lever caused by the motion of the piston can also be used to start or stop a pump by moving the belt on or off the tight or loose pulley, or to open or shut, by means of a lever, the stop-cock of a hydrant supplying a feeding-pump attached to the engine. The lever can also be connected with the lever of the stop-cock, in such a manner that the alarm whistle will be blown when the boiler needs feeding; but as the lever ascends toward its position indicated in dotted lines, the stop-cock will be shut until the feeding operation is performed, and the lever descends again by means of its weight.

UTILISING THE SCORIA FROM ANCIENT LEAD MINES IN GREECE—At port Mandri a French company are at present diligently smelting down the old scoria, slag, and refuse from the ancient lead mines, and extracting as much as 30 tons of metal a day. The work is said to pay well, and the lead chiefly goes to England in Newcastle ships, which bring out coal for the furnaces. The value of the daily produce of the works averages 15,000 fr., 5000 fr. of which are

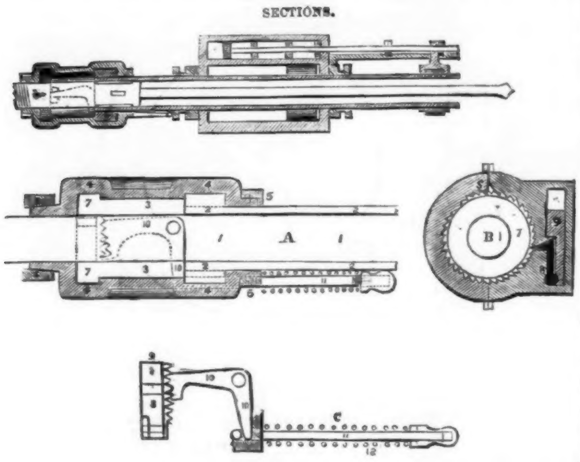
to be deducted for labour, in addition to the expenses of machinery and coal, and 10 per cent. royalty. It is calculated that there is a sufficient quantity of scoria between Cape Colonna and Port Mandri to supply the works for 15 years to come. The yield is between 7 and 12 per cent. of good metal.

ROCK-DRILLING BY MACHINERY.

REAR VIEW. SIDE VIEW.



SECTIONS.



Reference has already been made to an improved drilling-machine, invented by Mr. Herman Haupt, and it may be further remarked that it derives its chief recommendation from the circumstance of its being made very closely to resemble hand-boring. In drilling by hand three movements are observable—a reciprocating or back and forward motion, a rotation, and a feed or progression, as the drill penetrates. A machine to accomplish the same object must have the same movements, and the best drill is the one which accomplishes them all in the most simple manner, with greatest certainty, with least liability to derangement, and with the smallest expenditure for repairs. Numerous attempts have been made to construct machine-drills, and the drill of Mr. Sommelier, at Mont Cenis, has been heretofore the nearest approximation to success, although it is large and heavy, and expensive in working. The extreme length of Mr. Haupt's drill is only 32 in., considerably less than one-third the length of the Mont Cenis drill; it can be turned in any direction whatever. Two machines on the same stand can at the same time drill holes in directions nearly at right-angles to each other. It weighs about 125 lbs., and one man can lift it, handle it, or walk away with it. Its parts are so few and simple that it seems certain that no improvement can ever be made to reduce the number of parts even to the extent of a single piece and yet it contains all that are required for the movements. It is not liable to derangement. The wearing parts are inexpensive and easily renewed; every part is accessible for oiling. Any one drill can be removed and another inserted without stopping any other machine. The drilling-tools are inserted at the back and not at the forward end; a minute is sufficient time to take out one and insert another. The reciprocating movement in nearly all drilling-engines is produced by the to and fro motion of the piston. The points to be determined in connection with this movement are the diameter and stroke of the cylinder and the form of valve. If the drilling-tool be connected with the piston, and the blow upon the rock is given by the direct action of air or steam, the pressure per square inch being assumed, the diameter of cylinder necessary to secure any given total pressure is readily determined; the force of the blow is almost entirely independent of the length of stroke, and it, therefore, follows that the stroke should be as short as will fulfil the other essential conditions of moving the valve, rotating, and feeding. For these purposes 4 in. is found to be a convenient length, and the capacity of the cylinder is determined to be 4½ in. diameter, and 4 in. stroke, allowing a breadth of piston of 2½ in., and a small space for clearance at the ends, the inside length of cylinder is about 8 in. Drills constructed with larger cylinders involve a very great and unnecessary waste of power. The form of valve now used is nothing more than a piece of pipe, on which four rings are shrunk and accurately turned to fit the cylindrical steam-chest in which it moves; the two middle rings open and close the ports precisely as in a slide-valve when its position is shifted. If this valve had a rigid connection with the piston-rod it would be a balanced slide-valve, moving with very little friction, but possessing no other advantage; but the rod which moves the valve is not rigidly attached to it; it terminates in a piston in the middle of the tube, on each side of which are spiral springs, held and compressed by rings screwed into the ends of the tube. When the stops on the valve-rod are struck by the arm on the piston-rod, the effect is not immediately transmitted to the valve, but the spring yields to a certain extent to the blow before the inertia and friction of the valve are overcome. This gives the piston power to travel some distance after the stop is struck before its motion is retarded by the admission of steam.

Of the three movements required in drilling rock, the feed appears to have presented the greatest difficulty to inventors. The conditions of feed necessary for a perfect machine are, that it shall be automatic, not dependent in any manner upon the attention of the operator; that it shall be self-adjustable and variable, feeding with precision as fast as the tool has power to penetrate the rock, but no faster, varying its feed in the same hole with the varying hardness of the rock or sharpness of the point. Although the attempt to feed at the end of the forward stroke by the rotation of a nut proved a failure, no one but Mr. Haupt appears to have conceived the idea of giving the rotation to the nut on the back stroke, or if the necessity was discovered, the means of effecting the movement were not perceived. Nothing could be more simple than the mechanism by which this very important result is secured. It consists simply in allowing the forward movement of the piston instead of rotating the nut directly, to compress a spring which, on the back stroke, produces the rotation by its recoil, and thus gives the desired movement at a time when there is no strain whatever upon the parts. A, B, C, diagram of sections, illustrate this movement. A represents the drill-holder passing through the hollow piston-rod, 2, and the nut, 3, which contains a square thread, with a pitch of about ¼ inch, fitting a similar thread around the drill-holder, 1: 4 is a metallic box, enclosing the nut on all sides; this box is in two halves, opening with hinges at 5, 5: 6 is a ring, which carries a projection sliding in a spiral groove in the box, 4; by slipping on the ring, and then turning it, the two halves of the box are drawn lightly together and securely clamped; by taking off the ring, the box is opened, and the nut and rod immediately withdrawn; the nut can be made in halves if desired, but it is not necessary: 7 is a ratchet cut around the projecting edge of the nut, 3, which is rotated by the pawl, 8, and held by a spring, s: 8 is a pawl attached to and working in a recess in a rectangular piece of steel, 9; this piece slides in a recess in the box, 3, and carries a rack working into the teeth of an arc on the bent lever, 10: 10 is a solid lever, with the arms nearly at right angles, and the fulcrum around a stout pin in the side of the box, 4: 11 is a rod projecting forward from the box, 4, and terminating in an adjustable knob, by which the length is regulated. When this rod comes in contact with the end of the cylinder, the other end acts on the lever, 10, raises the pawl, 8, which slips over the ratchet, 7, without turning it; at the same time a very stiff spiral spring, 12, is forcibly compressed; on the back stroke the spring reacts, pulls the pawl, and rotates the feed-nut. The parts are so proportioned and adjusted, that the pawl may engage one, two, or three teeth, or none at all, according to the feed. If the drilling-tool feeds forward too rapidly, the movement of the rod and the throw of the ratchet are lessened, and a perfect compensation is secured, thus fulfilling every condition of a perfect self-acting and self-adjusting movement.

A careful consideration of all the inconveniences found to exist in the use of a four-column stand, as originally constructed, has led to the substitution of keys or wedges, instead of screws, wherever practicable, and the final result of many improvements is exhibited in the stand with two columns, represented in the subjoined diagrams.

Instead of four set screws at the bottom, the base rests on a cast-iron tripod, in which are three steel points, which, by means of a ball and socket joint, accommodate themselves to the inequalities of the surface, and require no adjustment whatever. The base is hollow, and divided by a transverse partition into two apartments, into one of which the live steam is admitted, and into the other the exhaust. The connections of the steam and exhaust pipes are shown in Fig. 3. On the base the two columns are placed, and attached by means of a screw cut on the outside of the column, or by rivets. The most convenient mode of attachment is by casting projections on the base, over which the columns can be placed and secured by riveting. The size of the columns should be about 4 in. exterior diameter, the thickness three-eighths of an inch, and the material wrought-iron. The connection at the top is by means of a strap (7) 2 in. deep, ¾ in. wide, with rings (8) to embrace the columns tightly. To obviate the loss of time, and the instability which result from too great length of the top screws, a second tube is provided to slide inside a column, like the tube of a telescope. This tube may be extended 1 ft. or 18 in. at one movement, and held by a pin, which passes through holes in the column, and upon which the bottom of the inner tube rests. The inner tube at its top end carries a nut, to which it is riveted, and through this nut passes the steel-pointed set screw (11), secured when in place by a jam nut, or by passing a rod through the holes in the screws of the two columns, which furnishes a convenient mode of locking them. Each stand may contain three or four drills, but three is a convenient number in driving a tunnel gallery 6 ft. high. The distance between the columns of each stand is 10 in., or 18 in. from out to out. The number of stands in use will depend upon the width of the gallery. In a heading 6 ft. high and 15 ft. wide it might be expedient to use four stands mounting twelve drills, in order to secure the most rapid progress possible; but two stands with six drills would give very satisfactory results, as two or more sets of holes could be drilled before blasting.

To hold the drill when at work, especially in commencing a hole, two points of support are necessary: after the drilling tool has penetrated a few inches the hole itself affords a firm support. The cross-bar (12) holds the forward end of the drill-cylinder, and the brace-rods (15) passing through the eyes of the clamps hold the rear end. These brace-rods are about 10 in. long, they are straight and round, ¾ in. in diameter; they are connected with the cylinder by means of an eye, which passes over a pin screwed into the end of the cylinder. The eye is prevented from slipping off by means of a wire through the end of the pin. The rod is furnished with a universal movement by means of the joints in connection with the eye. All the parts connected with the support and movement of the drill upon the stand have now been described, it remains to explain the manipulation required to place the drills in position. It will be observed that there is not a single screw connected with any of these movements, that keys have been substituted in every instance, that the keys are placed in a direction at right angles to the direction of the jar or strain, so that there is but little tendency to rattle loose, that every clamp piece has a transverse notch, through which the key passes, and that every key is wired. The advantage of effecting the adjustment by means of keys instead of screws became evident after a short course of experiments at the Franklin tunnel. The screws required to be turned in effecting the adjustment were not all of the same size; wrenches had to be adjusted to fit. Sometimes they would be mislaid, and time lost in looking for them. The annoyance from this cause was considerable; those who experienced it can appreciate the advantage of a system in which all the fastenings can be loosened in a few seconds by three or four light taps with a hammer, or a stone if the hammer is mislaid, and tightened again as readily. As the distance between the columns is 10 in., while the width of the drill cylinder is 6 in., and its length 10 in., there is a play of 4 in. to the right or left, and as the point of rotation at the forward end is about 4 in. in advance of the line of the columns, the rear end of the cylinder when placed on one side will swing clear of the column on the other side. This will admit of a range of horizontal movement exceeding 90°, a degree of mobility never before approached in any previous system of mounting, and impossible with any other than a very short machine. In a vertical direction there is no limit to the movement; the drills may be placed at any angle, from vertical upwards to vertical downwards. As the drill cylinder can be placed in contact with either column, it is possible to work as closely to either side of the tunnel as may be necessary. A narrower stand would possess no advantage in this particular. To shift the position of a drill it is not generally necessary to move the forward pivot, it is only required to loosen the two-column clamp keys and the two-rod clamp keys to secure a movement both horizontal and vertical. Less than a minute should suffice for this adjustment. The gum-pipes which carry the live and exhaust steam to and from each drill are not disconnected, except when a drill is to be sent to the shop for repairs; they remain attached to the drills, and stand and not interfere with the movements.

If a drill-point should break or become so dull as to require sharpening, the box at the rear end, which holds the feed-nut, is thrown open, the drill-rod with the nut attached is drawn out, and another rod and nut inserted; there is no necessity for losing time to back the drill-rod out by unscrewing the feed-nut as in other drills. If it should become necessary to remove one of the machines from the sand and substitute another, this, too, is very rapidly effected. The key in the plug at the forward end of the cylinder must be knocked out, the wires removed from the pins at the rear end, and the hose disconnected. As the hose-couplings are made upon an improved plan, without screws, the whole operation is performed with great celerity. All the couplings of pipes and hose are connected by simply pressing them together with the hand, and disconnected by pressing a spring and pulling them apart. For the rapid prosecution of mining and tunneling operations it is not sufficient that the engineer should be provided with a large number of perforators properly mounted so as to secure the requisite mobility and facility for adjustment. These are, of course, primary considerations; without a perfect drilling-engine everything else would be useless, but even with it there are many auxiliary appliances upon which the rapidity of progress essentially depends.

THE MANUFACTURE OF IRON IN GREAT BRITAIN.

In the Chemical Science section at the late meeting of the British Association, a paper was read by Mr. J. Lothian Bell on the present state of the manufacture of iron in Britain, and its position as compared with that of some other countries. In the outset of his paper he referred to the charge which had been made against this country in connexion with the Industrial Exhibition in Paris, to the effect that while different nations had been making wonderful advances in manufacturing science, little progres had been made in this country. He intended in this paper to confine himself to an attempt to institute a comparison between us and our neighbours in the treatment of iron ore and its products. The French exhibitors had displayed their specimens of iron manufacture to great advantage, while some of our own manufacturers had displayed a careless indifference in the mode which they had adopted to place the specimens of British iron manufacture before the visitors to the Exhibition. A practical man, however, had materials and opportunity enough in the Paris Exhibition to make a comparison between the state of the manufacture of iron in Britain and the state of the same manufacture in France and other countries. He had examined carefully the specimens of iron manufacture in the Champ de Mars, both by himself and in company with engineers and others well qualified to form a judgment upon the articles exhibited, and he was supported by the concurrent testimony of practical men who had been along with him in the examination, when he unhesitatingly pronounced the opinion that no evidence whatever was to be found in the Paris Exhibition that this country occupied a position less conspicuous for the excellence of its products than that of other nations. Mr. Bell went on to give a sketch of what had been done in this country towards advancing the manufacture of iron to its present condition, and in closing his sketch he stated that during a personal acquaintance with the ironworks of this and other countries, extending over many years, he could detect no change in the relative position of ourselves and other nations as iron manufacturers. There was no doubt that the manufacture of iron abroad had increased greatly of late years, but this was not due to greater proficiency in the manufacture abroad. He was of opinion that the present depressed state of the iron trade in this country had no connexion with the nature of the progress of the continental manufactures. It might be well, however, he said, for our own work people to know that although we had the start in this particular field of industry, there was not one department, from rolling the finest wire iron and the thinnest tin-plates or hoops, to turning out the largest rails or heaviest armour-plating, in which these operations are not performed quite as well by foreign labour as by the most expert rollers in the best mills in this country.

Noticing next the relative facilities enjoyed on the Continent and here in the manufacture of iron, Mr. Bell said that, so far as a careful examination of ironworks producing above one-half of the collective make of France and Belgium had enabled Mr. Lancaster, the ironmaster of Wigan, and himself to judge, the disappearance of the natural advantages placed at the disposal of the iron-manufacturers of this kingdom over other countries was due neither to greater science possessed by the ironmaster nor to greater skill on the part of the workmen, but was wholly to be ascribed to the cheaper rate at which labour was obtained abroad than with us. The creation of additional industry abroad, and the introduction of free trade in this country, had entirely changed the aspect of affairs as to the relative position of workmen, provisions being now from 20 to 30 per cent. dearer to the foreign labourer than they were 20 years ago. Nominally food was only 3 per cent. cheaper in the chief seats of continental manufacture than with us, while house rent and clothing were about the same in value with both. On the other hand, at the present moment wheat was lower in England, and our workmen do not pay half the prices charged to persons of their own class abroad for firing employed for domestic use. Notwithstanding this almost perfect equality in most of the necessaries of life, labour on the Continent was in many instances 30 per cent. below the price which it commanded in this kingdom. This estimate was based on calculations where there was no room for any great difference in the nature of the work performed—common brickmaking being assumed as one of the standards of comparison. In the manufacture of iron itself this difference was still more remarkable. Colliers, miners, iron-workers, mechanics—in short, everyone engaged in the process—appeared to be receiving from 20 to 30 per cent. below the rates current in this country; and in some cases double, and more than double, the wages paid abroad were earned in our English ironworks. The ironmasters here had endeavoured to meet what would be an intolerable burden in the production of an iron article made up almost exclusively of labour by adopting means for reducing its amount, often considerably in advance of those met with in foreign establishments. After all this had been done, however, it left the ironmasters of this country to contend with an extra charge of at least 15 per cent. in the item of wages, which in the majority of instances would be found to annihilate any advantage of position which we might otherwise possess. It must be clear that when this country has to compete with foreign nations in articles involving a still higher amount of labour—such as steam-engines and other kinds of machinery—the difference in wages acted still more prejudicially to the advancement of our national industry.

The future of the iron manufacture in this country was of great interest to the political economist. The great strength of our position, as iron manufacturers, must be sought for in those incomparable fields of coal which constitute so important a feature in our mineral wealth. He was confident that this advantage would, notwithstanding present difficulties, maintain the iron trade among the most prominent of onr national branches of commerce. Favoured as we were by nature, there seemed nothing wanting for success in this noble branch of manufacturing science but a continuance of that unflagging spirit of enterprise on the part of the masters and the exercise of that operative skill on the side of our workmen which were still unsurpassed in any iron country. But in this alliance a correct knowledge by both of the competition we have to meet, and a thorough belief in the inseparable interests of each, were indispensable.

IRON AND STEEL SHOWN AT THE PARIS EXHIBITION.—At the British Association, Mr. J. Fernie stated that a great deal had been said about the advance the French had made in this department, but he thought this was erroneous. Coal was sent into France free of duty, and English raw iron with a very small duty. When, however, the English came to send their finished iron into France, it was practically prohibited by the very high duty imposed. The only iron in the Exhibition from England was from a few of the best Yorkshire houses, and one or two other specimens. He first called attention to the large girders. There were several specimens of these exhibited in the French department, which were far larger than any ever rolled in this country. These girders were 3 ft. 7 in. in depth, but only 12 ft. long—a length wholly inadequate in proportion to their depth. The length for all practical purposes should be at least 15 times the depth. These were mere *tours de force*. He believed that the process of building up such masses of iron, and the frequent reheating and cooling necessary for the purpose, would not produce a girder anything like equal to a girder made in the ordnary way—of boiler-plate, riveted together. These girders, in the opinion of Mr. Fernie, had been made for the purpose of going beyond the English people, and not so much for their practical value—in short, to excel the English in this respect. Another process of the manufacture was that of stamping, lately introduced, and which has been very largely carried out by the French. This process was to make a complicated forging in small pieces fixed together; putting it in the furnace, then raising it to a welding heat, bringing it under an immense die or hammer, and then completing the process of forging. This process had not come into use in this country; but one English house had shown several specimens quite equal in manufacture to those exhibited by the French. The manufacture of steel in large masses, exhibited by Krupp and the Bocum Company, far exceeded in size anything as yet manufactured in England. The specimens from the Bocum Company were, in the opinion of Mr. Fernie, deserving of special mention. Twenty-two railway wheels of cast steel, in one casting, were, he believed, the finest ever exhibited. So far as France is concerned, England had not been excelled in any department in the manufacture of iron or steel.

FOREIGN MINING AND METALLURGY.

In connection with the supply of coal for the Belgian State Railways, and in reference to contracts recently let, it appears that the Minister of Public Works has come to terms with the Bonne Espérance and Batterie, Patience and Beaujonc, Paradis and Chartreuse Collieries, which have reduced the price of their coal 5d. per ton. The other collieries have declined to accept the invitation of the Minister of Public Works to send in amended tenders, although they have—Courcelles for example—a considerable stock in warehouse. The reduction agreed to is not without importance, especially when it is considered that for every 10 tons of coal really received the State pays for only 9½ tons to the contractor. Some coal of a Prussian Company, presented at an adjudication held July 31, has been tried in Belgium, and the results are stated to be very favourable. There is nothing particularly novel to notice in the general state of the Belgian siderurgical markets, which remain without the least appearance of improvement. Some contracts for rails have presented themselves, but on terms so low that arrangements could not be concluded. There is a rumour of a fresh extinction of blast-furnaces in the Charleroi group; in the present state of siderurgical affairs it would not be surprising if this report were confirmed. The Providence Forges Company will pay, Oct. 31, a dividend for the exercise 1866-67, or 2*l.* per share. The Augsburg Company for the Manufacture of Machinery will pay, Oct. 1, a dividend for the exercise 1866-67, or 5*l.* per share. Meetings are announced as follows:—Sieg-Rhein Mines and Ironworks Company, Sept. 25, at Cologne; Charleroi Iron Manufactory Company (Victor Gilleaux and Co.), Sept. 28, at Charleroi: Sars-Longchamps and Bouvy Colliery Company, Oct. 31, at St. Vaast.

It appears that during the first half of this year 18,349 tons of pig were admitted into France duty free, and 57,392 tons with payment of duties. During the corresponding half of 1866 the imports comprised 43,198 tons free of duty, and 20,628 tons with payment of duty, showing for this year a diminution of 28,848 tons on imports duty free, and an augmentation of 36,764 tons with payment of duties. The imports of iron and plates free of duty amounted in 1867 to 24,890 tons, against 28,780 tons in 1866, showing a diminution of 4000 tons in round numbers. The imports with payment of duty increased, on the contrary—viz., from 1397 tons in the first half of 1866 to 3794 tons in the first half of 1867. The total deliveries by warrants for pig, iron, and plates, which amounted in the first half of 1866 to 87,651 tons, declined to 59,388 tons in the first half of this year. These figures sum up the position of French siderurgy. The sensible augmentation remarked in the imports of pig with payment of duties explains the distress of the blast-furnaces in districts harrassed by foreign competition. The important diminution which has occurred in the imports free of duty arises, no doubt, from the reduction of the exports. The Terrenoire Company has just received an order for 2000 tons of

Bessemer steel rails for the Eastern of France Railway Company, at the rate of 12l. 11s. 2d. per ton, delivered at Saincaige, which represents about 12l. 17s. 6d. per ton taken at the works. The whole of the orders which the Terrenoire Company have now on hand for Bessemer steel amount to 30,000 tons, showing that the production of Bessemer steel is being very considerably developed in France. We may add, while speaking of Bessemer steel, that we learn that the Boignes-Rambourg Company is about to establish this manufacture at Montlucon. The Creusot Works have received from the Southern of France Railway Company an order for 18 large locomotives for goods trains; these engines will have eight wheels coupled, with boilers of steel and corresponding tenders. It is stated that the Creusot Works have also contracted for 80 locomotives for Russian lines; it is said that to obtain this latter contract Creusot has had to agree to accept obligations to a large extent, and this notwithstanding relatively low prices. In the Moselle mention is made of the delivery of 200 tons of refining pig, made by MM. Karcher and Westermann to MM. Dupont and Dreyfus, of Ars-sur-Moselle, at 2l. 14s. per ton. The three principal producers of iron in the Moselle have now 15 blast-furnaces in activity—MM. Karcher and Westermann, 1; MM. Dupont and Dreyfus, 3; and MM. de Wendel, 11. Notwithstanding the depression complained of in affairs, the house of Hayange is still extracting 31,000 tons of minerals per month, corresponding to a monthly production of 11,000 to 12,000 tons of pig. MM. Dupont and Dreyfus intend to undertake the manufacture of projectiles, and it is said they hope to succeed in allying Ars pig with English pig. At Hayange this fabrication has proved perfectly successful, through the employment of second fusion minette pig. It is stated that the artillery department has given out a fresh order for projectiles in the Moselle, but the rumour requires confirmation. The French iron trade remains unchanged, and it is urged that no improvement can be hoped for so long as half measures only are taken for the reduction of the fabrication. How, it is further asked, can there possibly be an advance in products when establishments are found which are ready to sell at any price? The Council-General of the Loire-Inférieure has recorded the expression of its wish that the traffic in iron warrants should be suppressed. Meetings are announced as follows:—J. F. Cail and Co., Sept. 26, at Paris; Stiring Collieries Company, Sept. 28, at Paris; Sougland and Fourmies Forges and Foundry Company, Sept. 28, at Paris; Andennes Metallurgical Company, Oct. 1, at Andenelle; Bois Colliery Company, Oct. 3, at Quaregnon.

No very important transaction has been noted at Havre of late. The sale is mentioned, however, of a lot of 15 tons of Chilian in bars, to be delivered at 75l. 2s. per ton. A lot of 20 tons of disposable was also sold at 75l. per ton. The stock of Chilian on the Havre market amounted on the 1st inst. to 3770 tons of bars and 550 tons of ingots. At Marseilles the article remains sustained at the previously quoted rates, although the sales effected have been almost nothing: Toka is quoted at 76l.; Spanish, 74l.; refined Chilian and Peruvian, 82l.; rolled red copper for sheathing, 88l.; ditto yellow copper, 80l. per ton. The Paris market has been quiet, and prices have remained without change; English in plates has made 80l.; Lake Superior, 82l.; Chilian, 71l. 10s. to 76l.; and Corocoro mineral, 79l. per ton. On the German markets the position of affairs is represented as satisfactory, the article finding a regular outlet at previously indicated rates. The approaching sale of the Dutch Society of Commerce is the event which excites the most interest at present upon the continental tin markets. Buyers have shown themselves much more reserved on the Dutch market, and in consequence of the slackness of the demand holders were induced to make some concessions as regards prices; these concessions, however, provoked some fresh purchases. The sale has been noted at Rotterdam of 500 blocks of disposable Banca at 54½ fl., 800 ingots at 54¼ fl., 800 ingots at 54½ fl., as well as 400 ingots of Billiton at 53 fl., 200 ingots at 52¾ fl., and 300 ingots at 53 fl. The Marseilles market has slightly risen, and Banca and English have been quoted at 94l. per ton. The Paris market has remained without change; Banca has made 98l.; Straits, 95l.; and English, 94l. per ton. At Berlin, Cologne, and Stettin the article has been supported at former rates. The tone of the lead markets continues satisfactory; the advices from Germany more particularly are favourable, and without any exceptionally important demand being indicated, it may be observed that the orders received are executed at firm rates. At Hamburg the article is held very firmly, and the demand is more sustained. On the other hand, sales have fallen off at Breslau, and no transaction has been reported this week; and notwithstanding the generally more favourable tendency of the article, buyers appear little inclined to accept the pretensions of producers. The reports received from Paris have not indicated any striking improvement in the article; rough Silesian zincs remain quoted at 21l. 16s. per ton, and zinc from other sources at 21l. per ton.

FOREIGN MINES.

CHONTALES.—W. C. Paul, Aug. 7: Consuelo Mine: I am still continuing the sinking of No. 2 shaft, but which is getting on slowly; the lode is about 4 ft. wide, and still has a rich nail, and on an average it will produce 3 ozs. per ton. I wish to effect a communication with No. 3 level as soon as possible: first, for ventilation of air; secondly, that by the mining laws of the country we may be allowed to take out the rich pillars now standing in and between Nos. 2 and 3 levels, which at present we have no legal right to take away. I calculate about two months more will accomplish this object. No. 2 shaft was being sunk by native contractors last month, but, owing to the richness of the nail, I am now having it done by our English miners. No. 2 level, east of this shaft, is being driven by one Englishman and three natives; the lode is about 3 ft. wide, and produces fully 3 ozs. per ton; the ground is, however, very heavy and dangerous, on account of the surface water, which pours down through it whenever it rains. We take all the care and precaution possible, and hope to be able to prosecute it without accident, but the summer months would be far preferable for this work. No. 3 adit level is being pushed forward by a native contractor; the lode is large, and produces a little gold, but not yet of importance.—Estrella Mine: Nothing has been done underground during the month except timbering, securing old levels, &c.—San Antonio Mines: East San Antonio shaft has been sunk 5 fms.; the lode without alteration since last report, still producing about ½ oz. per ton. We are now rising from the back of the tunnel, or deep adit level, towards the above-mentioned shaft, in order to facilitate a communication as early as possible; the lode in the rise, as also in the end driving west at this place, is of a promising description, producing about ½ oz. per ton. In the old workings, No. 3 level driving west is rather small (18 in. wide), but worth 1½ oz. per ton.—Santo Domingo Mine: The level driving west from the tramway is now being carried around the run in order to get into firm ground, as we found it impracticable to continue spilling through the run; this level we shall continue till we get into the old workings, and communicate it with No. 1 level, driving east from Santo Domingo; the lode in the latter level (No. 1) is all the width of the level (say) 5 ft., and yields an average of about ½ oz. per ton. No. 2 level east has passed through a short rich nail during the month; the lode is about 4 ft. wide, and at present averages about ½ oz. per ton; in the same level west the lode is small, producing ½ oz. per ton.—Cabazales de Javali Mines: Here we have cut through several branches of a lode, but being so close to surface (say 10 ft.) it is so mixed with clay that we cannot say the size of it, as it is all in disjointed patches. The quartz rock from the veins, however, yields a fair percentage of gold, and I hope to be able to report a good lode. We are now sinking a shaft in the Internpacion part of this mine; the lode is very large (size not to be seen) in the shaft, 8 ft. wide, and produces gold to pay for grinding, but not rich; it also produces silver, to which we shall pay attention when we commence grinding from it.—Surface: At Consuelo the new machine is getting on very well for the small force employed on it. I hope to get it at work by about the begining of next month. The contractor is making good progress in laying down the tramway to Santo Domingo, his men not having left him up to this time. The new machine at Santo Domingo continues to work very satisfactorily, but from want of sufficient labourers we have not been able to supply grinders of sufficient size to grind well; we hope to be able to put in larger ones shortly. We have had six cups working at one time occasionally, but the supply of water has not been continuous, or near so much as in the same month last year. The tramway from this to Pavon is going on satisfactorily, as also a short one, now being made by the same contractor to Santo Domingo shaft; the latter I hope will be completed this month, and the other in time for the new machinery erecting at the Pavon. We are now labouring under great difficulty to bring plank, &c., from the Pavon, as the roads are in a bad state, but this will cease when we get the tramway completed. I am very sorry to advise you of a second accident in the making of the wheel-pit, which completely destroys the practicability of making it where first commenced; fortunately, it happened at night, and no one was hurt by it. We have now decided on making a new one some few yards distant from the other; this has been commenced, but, unfortunately, now idle for want of native labourers, all, excepting carpenters, having left Mr. Wells, the contracter, on account of one case of cholera which occurred here last week. Mr. Wells has made good progress towards the new machine, and will not, I think, be far behind the time stated or extended in his contract for same, unless we, unfortunately, get another few cases of cholera, when, I think, not a native would remain on the mines. We have been, and still are, using all the means we can towards cleansing the place in a sanitary point, and hope not to see any return of cholera in our midst. I enclose captain's report and estimate for this month.

LUSITANIAN.—Sept. 10: Palhal Mine: The lode in Taylor's engine-shaft, below the 110, produces 3 tons of ore per fathom, for its length, 15 feet. The plat in the 110 fm. level, at Taylor's, is now complete. The men are now engaged in the preparatory work required for bringing down the plunger from the 100 to the 110.—Levels on Great Caunter Lode: In the 60, west of Oak engine-shaft, the lode is 8 in. wide, composed of flookan. We have recommenced stoping above the 100, east of Taylor's.—Levels on Basto's Lode: The lode in the 90, east of River shaft, is 1½ foot wide, composed of flookan. The plat in the 90, at River shaft, is completed. The lode in the 110, east of Taylor's engine-shaft, is divided into two distinct parts, each producing copper ore; together 1 ton per fm. The lode in the 110, west of Taylor's shaft, is 2 feet wide, composed of quartz and a branch of ore, yielding ½ ton per fm. In the 100, west of Taylor's shaft, on slide lode, the lode is 1 foot wide, composed of flookan. The lode in the 100, east of Taylor's, on Basto's lode, is 2½ feet wide, composed of quartz, and a branch of ore producing ½ ton per fm.; the lode has much improved in appearance. The lode in the 70, east of River shaft, is 4 feet wide, composed of quartz and stones of ore. The 38, west of Perez' shaft, is composed of flookan and stones of ore, and is letting out a little water; the lode is 6 in. wide. In the 70, west of slide lode, the lode is 4 in. wide, formed of flookan and quartz. The lode in the 18, west of Perez' shaft, is 1 foot wide, yielding stones of ore.—In the adit level west, on Perez' shaft, the lode is 8 in. wide, yielding ½ ton of ore per fm.—Levels on the Caunter Lode: The lode in the 90 east, on slide lode, is 1 foot wide, composed of flookan. The 80, east of slide lode, produces ½ ton of ore per fm.; lode 1 foot wide. The lode in the 70, east of slide lode, is 1 foot wide, composed of flookan.—Levels on Ponte Lode: The lode in the 28, east of Ernesto's winze, is 1 foot wide, composed of quartz. In the 60, north of River shaft, the ground is composed of hard gneiss; such, also, is the character of the 100, south of Taylor's, and the 28, south of Basto's lode—Winzes, &c.: The No. 63 winze below the 90, east of Taylor's, is communicated with the rise above the 100. In No. 64 winze, below the 100, west of Taylor's, the lode is 1½ ft. wide, composed of quartz and stones of ore. The winze No. 66, below the 60, west of Taylor's, on slide lode, produces 1 ton of ore per fm. Stoping below the 60, on the slide lode is to be resumed after the winze is holed. The lode in the below the 70, against No. 66 winze, produces ½ ton of ore per fm. In winze below the 50, west of Taylor's new lode, the lode yields 1 ton of ore per fm. In the stopes on Basto's lode, above the 18, west of Fonsaca's winze, the lode produces 1 ton of ore per fathom. Above the 28, east and west of No. 58 winze, the lode yields 1½ ton of ore per fathom. Above the 80, east and west of Domingo's winze, the lode produces ¾ ton per fathm. Above the 80, east of Taylor's, the lode yields ¾ ton per fathom. Above the 80, west of Ernest's winze, the lode is worth 1¼ ton per fathom. Below the 60, east of River shaft, the lode produces ¾ ton per fathom. Above the 90, east and west of Taylor's, the lode is worth 1 ton per fathom. Above the 90, east of No 61 winze, the lode is worth ¾ ton per fathom. Above the 100, east of Taylor's, the lode is worth 1¼ ton of ore per fathom. Above the 100, west of Taylor's, the lode yields ¾ ton of ore per fathom. Above the 28, west of Taylor's, the lode is worth 1 ton per fathom.—Stopes on Caunter Lode: Above the 80, east of No. 59 winze, the lode yields ½ ton of ore per fathom. Above the 70, east of Tavara's winze, the lode produces ¾ ton per fathom. Above the 50, west of Machado's winze, the lode is worth 1 ton per fathom. The stopes on the great caunter lode, above the 50, east of Laurenco's winze, is worth ½ ton of ore per fathom.—Stopes on Mill Lode: Above the 38, east of Taylor's, the lode produces ¾ ton per fathom. Below the 38, east of Taylor's, the lode is worth ½ ton per fathom.—Carvalhal Mine: In the 110, east of the incline shaft, we have began driving a cross-cut south, for the purpose of intersecting some south branches which went off in that direction at the shaft. We have nothing yet but water. In the 46, west of incline shaft, the lode is 2 feet wide, composed of quartz and blende; of blende it produces 3 cwts. per fathom. The lode in 30, east of incline shaft, is 1 foot wide, composed of quartz and lead, worth 5 cwts. per fathom. The lode in the 30, west of incline shaft, is 3½ feet wide, composed of quartz and blende, producing of the latter ½ ton per fathom; there are also stones of lead to be found in this lode. In the 20, east of incline shaft, the lode produces 1 ton of lead per fathom. The 20, west of incline shaft, is suspended. In the 20, west of incline shaft, on caunter lode, the lode is 2½ ft. wide, of quartz, lead, and blende, worth ¼ ton per fathom. In the stopes on great lode, above the 30, east of incline shaft, the lode produces ¾ ton of lead per fm. In consequence of the great quantity of water the winze below the 30 is suspended. The stopes above the 30, east of winze No. 3, yields 1 ton per fm. Above the 20, east of incline shaft, the lode produces 1 ton per fm.—Figueiredo Mine: Henty's shaft, below the 20 metre level, is now down to the 40. The plat in the 40 metre level is completed. The 40 metre level south has intersected the lode. In the 40 metre level, east of Henty's shaft, the lode is 2 ft. wide, composed of flookan, quartz, mundic, and small stones of copper ore.

BELSTONE CONSOLS.—Mr. John Calvert has found some very interesting stone implements while prosecuting some discoveries at this mine—a stone ring and a pick head, both in an excellent state of preservation. Mr. Calvert has also found a boomerang adze, with a rude marking of the old British elephant upon it, evidently made from the greenstone of the district.

ZINC PAINT.—An improved metallic zinc paint has been invented by Messrs. WEBSTER, DEANE, and RUMBLE, of Birmingham. They propose to take spelter and melt it in a suitable furnace, and raise it to about 800° Fahr.; they then cover the molten metal with a flux of borax mixed with caustic of soda or chloride of ammonia, or other suitable flux, to prevent the action of the atmosphere upon the surface of the molten zinc; they then add thereto about 7 or 8 per cent. (or more or less) of finely-divided iron wire or scrap, agitating the whole with an iron rod until the whole of the iron or scrap particles are taken up by the zinc; they then add sufficient antimony to cause the metal to run freely from the furnace. When the metal thus prepared has cooled down it is next pulverised and ground, when it may be mixed with any oleaginous matter or varnish, and applied as the zinc paint results. When the paint is intended to be used for coating ships' bottoms or marine purposes they add thereto 1½ per cent., or thereabout, of vermillion or oxide of mercury.

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